

## REMARKS

The Applicants appreciate the Examiner's thorough examination of the subject application and the indication that claims 54-56, 58, 61, 63-68, 70, and 71, if rewritten in independent format, would be in a condition for allowance. Applicants request reconsideration of the subject application based on the following remarks.

As an initial matter, Applicants appreciate the courtesy extended by the Examiner during the telephonic interview conducted on November 17, 2004. During the interview the pending §103(a) rejection was discussed including particularly the scope of disclosure of the prior art references and the motivation to combine the cited references. Although no agreement regarding the claims, as amended on March 24, 2004 was reached, the Examiner did indicate that the claims, as amended herein, in combination with an statement that such claims to not encompass methods of forming a composite membrane by impregnation may be sufficient to overcome the pending §103 rejections as discussed *infra*.

Claims 51-76, 118, 119, and 121-124 are currently pending in the application. Claims 51, 75, 118 and 119 have been amended. Support for the amendments can be found throughout the specification. See, for example, page 24, line 34 to page 25, line 28. No new matter has been introduced by the instant amendments.

Referring to the outstanding Office Action, the rejection of claims 51-53, 57, 59-60, 62, 69, 72-76, 118-119, and 121-123 under 35 U.S.C. §103(a) as being allegedly unpatentable over Kindler (U.S. Patent 4,865,930) in view of Arnold (U.S. Patent 4,714,663) has been maintained by the Examiner.

Applicants again respectfully traverse the rejection.

With respect to claim 51, the Office Action appears to have relied upon claims 1-4 and the specification at column 3 of Kindler and Examples 1-2 and claims 1-2 of Arnold. More

particularly, the Office Action has averred that “Arnold Jr et al disclose a preparation step of a composite membrane including casting the membrane itself (Examples 1-2)...” See page 4 of the Office Action.

Applicants respectfully disagree with the Office Action and provide the following remarks to clarify the disclosure of Arnold. Example 1 of Arnold provides a method of first purifying Udel 1700P (a sulfonated polysulfone) and then casting a dimethylformamide solution of the Udel polymer on a releasable surface to form a solid Udel membrane, e.g., a dense Udel film. Thus, Example 1 recites a method of forming a Udel membrane by casting a DMF solution of the resin onto a releasable substrate, which substrate can be removed without damage to the membrane, e.g., typical releasable substrates include glass or other materials having a hard smooth surface to which the membrane does not stick. The resulting membrane formed by Example 1 of Arnold is composed essentially of the sulfonated polysulfone, e.g., the membrane is **not** a composite of the sulfonated polysulfone and another polymer.

Example 2 of Arnold recites a method of forming a composite membrane by impregnating a pre-formed GoreTex sheet (microporous polytetrafluoroethylene membrane) with a sulfonated polysulfone by dipping of the GoreTex sheet in a DMF solution of the sulfonated polysulfone. Thus, Example 2 of Arnold does not recite a process step of casting of a composite membrane from a common solution of the substrate polymer and the ion-conducting membrane.

Moreover, the specification of Arnold teaches that dense film membranes (such as the membrane of Example 1) can be prepared by casting a sulfonated polysulfone polymer from a solution onto a surface. In contrast, Arnold teaches that composite membranes are prepared by impregnating a pre-formed porous substrate with a sulfonated polysulfone polymer. See, column 3, lines 29-35 of Arnold.

The process of Example 2 of Arnold is substantially identical to the process of Kindler recited at column 3, lines 39-43 and 54-65. The process claimed by Kindler further comprises a stretching step to reintroduce porosity into the composite membrane.

More particularly, Kindler teaches that a porous polymer (polypropylene, polytetrafluoroethylene, or polysulfone) is provided (column 3, lines 16-19). Subsequently, the porous substrate is impregnated by contacting the porous substrate with an ion conducting material as recited at column 3, lines 60-66. In each recitation the solid porous substrate is contacted with a fluid comprising the ion conducting material or a precursor of the ion conducting material.

Both Kindler and Arnold recite **impregnating** a pre-formed porous substrate with a solution containing an ion-conducting material (such as sulfonated polysulfone) to generate the composite membrane. No combination of Kindler and Arnold teach or suggest a process step of casting or extruding a composite membrane from the common solution of the substrate polymer and the ion-conductive material.

Claims 51, 118, and 119 have been amended to provide a process step of preparing a **common solution** of the substrate polymer and the ion-conductive material in order to more particularly pointing out the subject matter of the invention and to expedite prosecution of the application. Applicants respectfully submit that the cited art neither teaches nor suggests the preparation of said solution nor provides any motivation or expectation of success to one of ordinary skill in the art to make a common solution of the substrate polymer and the ion-conductive material. More particularly, the claimed invention, as presently amended, provides methods of preparing composite membranes which do not encompass processes comprising an infiltration or imbibing a pre-formed porous substrate with a second material.

In the interest of advancing prosecution of the application, claims 51, 118 and 119 have been amended to provide process steps of (1) providing a common solution of substrate polymer and ion-conducting material and (2) casting or extruding the composite SPEM from the solution. The claims as amended do not encompass processes involving impregnation of a pre-formed porous substrate for at least the reason that a solid porous substrate submerged in a solution of the ion-conducting material is not a solution.

Thus, the claims have been amended in the interest of advancing prosecution notwithstanding Applicants' belief that the method claims as previously presented are patentable over the cited art. Applicants reserve the right to pursue the subject matter of claim 51 as originally presented in this or a subsequent application.

Thus, no combination of Kindler and Arnold teach or suggest to one of ordinary skill in the art a method of preparing a composite membrane in which a substrate polymer and an ion-conducting material are prepared in a common solution. As discussed *supra*, each of the documents teach impregnating a pre-formed porous substrate with a solution of the ion-conducting material, which impregnating step is not within the scope of the pending claims at least because the impregnating step is a heterogeneous mixture of the porous, **solid** substrate and a solution of the ion-conducting material. Thus, a common **solution** of the substrate polymer and the ion-conductive material are is neither taught nor suggested by any combination of the Kindler and Arnold documents.

Each of the process steps of claims 51, 118, and 119, as amended, is individually or in combination substantially distinct in terms of **function, manner and result** from those process steps recited by the Art of record for at least the reasons discussed herein.


Thus, for at least the reasons discussed herein, claims 51, 118 and 119 are patentable over any combination of the Kindler and Arnold patents. Claims 52-53, 57, 59-60, 62, 69, 72-76, and 121-123 depend from claims 51, 118, and 119 and are therefore also patentable over the combined teachings of Kindler and Arnold.

The claims are patentable, for at least the reasons discussed, over the prior art cited in the outstanding office action. Applicants respectfully request reconsideration and withdrawal of the rejection.

Although it is not believed that any additional fees are needed to consider this submission, the Examiner is hereby authorized to charge our deposit account no. 04-1105 should any fee be deemed necessary.

Respectfully submitted,

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